Autonomous In-situ Control and Resource Management in Distributed Heterogeneous Sensor Webs (CARDS)

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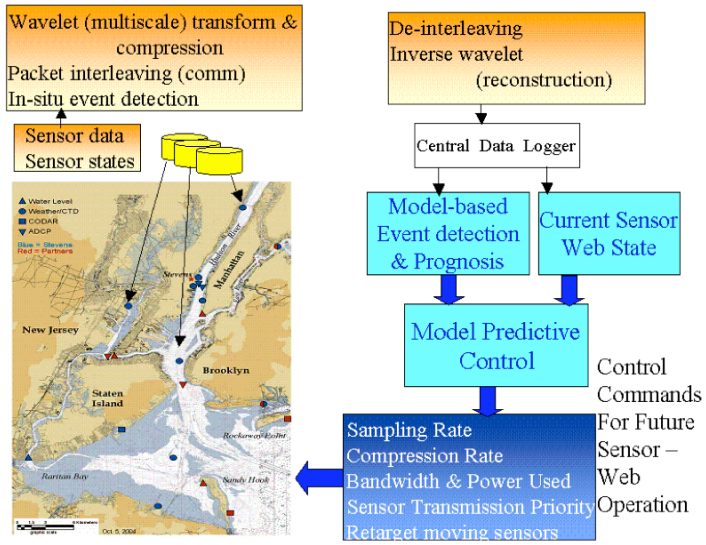
Objective

We will design, implement and integrate model-based control tools into the existing New York Harbor Observation and Prediction System (NYHOPS) sensor web with the following primary task objectives:

- Adaptive in-situ control of multiple resources in heterogeneous spatially distributed sensor webs
- Model based event detection and prognosis from distributed sensor measurements
- Off-line science validation of NYHOPS sensor web operational autonomy and control with CARDS
- Explore technology infusion into other sensor networks in follow-on efforts



Concept for Control and Resource Workflow Mgmt. of Sensor Webs

Approach

- Advance generalized model predictive control (MPC) solutions to jointly coordinate, control, and manage workflow of multiple heterogeneous sensors while ensuring that system operates within constraints
- Model-based, information-theoretic framework to evaluate forecast anomalies, detect & predict events
- Design new decentralized MPC controller paradigm for distributed control of *very large* sensor webs

Co-Is/Partners

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Key Milestones

• Centralized spatiotemporal MPC design	Apr. 07
• Uncertainty quantification for sensor webs	Apr. 07
• Event detection & prediction algorithm design	Jul. 07
• Spatiotemporal MPC sensor web control demo on simulated (generic) spatiotemporal events	Sep. 07
• Centralized MPC control and event detection validation on NYHOPS sensor data	Dec. 07
• Preliminary decentralized MPC concept design for distributed control in large scale s	Dec. 07

$TRL_{in} = 2$

Jan. 2006

ESTO Earth Science Technology Office